Printing

(NAICS 32311, 32312)

SIGNIFICANT POINTS

- Most firms are small, employing fewer than 10 people.
- Computerization is changing or eliminating occupations, resulting in a slight decline in projected employment.

Nature of the Industry

The printing industry prints products ranging from newspapers, magazines, and books to brochures, labels, newsletters, postcards, memo pads, business order forms, checks, maps, T-shirts, and packaging. The industry also consists of establishments that provide related services to printers, such as embossing, binding, finishing, and prepress services. Commercial lithographic printing establishments, which print newspaper inserts, catalogs, pamphlets, and advertisements, make up the largest segment of the industry, accounting for about 40 percent of employment and 32 percent of total establishments. Establishments offering primarily digital printing, which is the most technologically advanced method of printing constitutes the smallest segment of the industry—about 3 percent of total employment. Much of the work of this segment is characterized by low volume, often done by very small shops or freelance workers. Another segment of the printing industry is quick printing. Quick printing establishments generally provide short-run printing and copying with fast turnaround times.

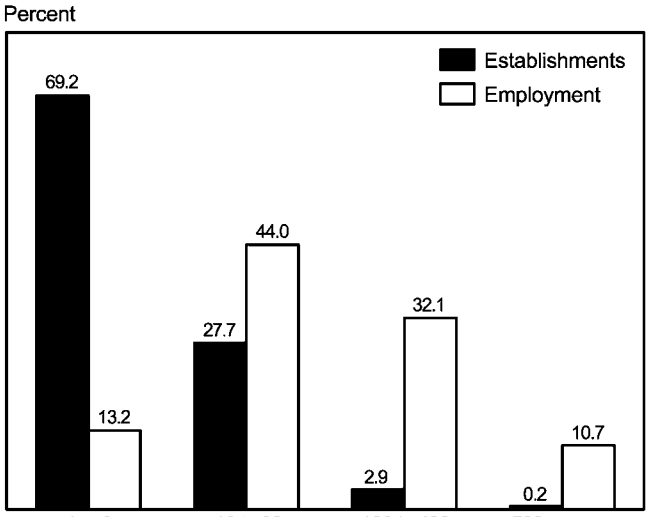
Printing is a large industry composed of many shops that vary in size. More than 2 of every 3 printing shops employ 10 or fewer workers. (See chart.) These small printing shops often are referred to as "job shops," because what they print is determined by the needs of their customers.

There are five printing methods that use plates or some other form of image carrier—lithography, letterpress, flexography, gravure, and screen printing. Plateless or nonimpact processes, such as electronic, electrostatic, or inkjet printing, are used mainly for copying, duplicating, and specialty printing, usually in quick printing or in-house print shops.

Lithography, which uses the basic principle that water repels oil, remains the dominant printing process in the industry. Lithography lends itself to computer composition and the economical use of color, accounting for its dominance. Letterpress prints images from the raised surfaces on which ink sits; the sunken surfaces do not show up on the paper. The raised surfaces are generated by means of casting, acid etching, or photoemulsion. In the future, flexography, and gravure to a lesser extent, are expected to be more widely used than at present. Flexography produces vibrant colors with little ruboff, qualities valued for newspapers, directories, and books, which are its biggest markets. Gravure's high-quality reproduction, flexible pagination and formats, and consistent print quality have won it a significant share of packaging and product printing and a growing share of periodical printing.

Another type of printing included in this industry is screen printing, also known as commercial screen printing. This method is used to print designs on clothes and other fabric items, such as caps or napkins. In response to environmental concerns, printers increasingly use alcohol-free solutions, water-based inks, and recycled paper.

About 2 out of 3 establishments in printing employ fewer than 10 workers



The printing industry, like many other industries, continues to undergo technological changes, as computers and technology alter the manner in which work is performed. Many of the processes that were once done by hand are becoming more automated. Technology's influence can be seen in all three stages of printing: *Prepress*, preparation of materials for printing; *press*, the actual printing process; and *postpress* or *finishing*, the folding, binding, and trimming of printed sheets into final form. The most notable changes have occurred in the prepress stage. Instead of cutting and pasting articles by hand, workers now produce entire publications on a computer, complete with artwork and graphics. Columns can be displayed and arranged on the computer screen exactly as they will appear in print, and then printed. Nearly all prepress work is becoming computerized, and prepress workers need more training in computers and graphic communications software. Printing processes today use scanners to input images and computers to manipulate and format the graphic images prior to printing. Digital printing also is transforming prepress operations as well as the printing process. It eliminates much of the lengthy process in transferring print files to the printing press by directly transferring

digital files to an electronically driven output device bypassing most prepress operations.

Working Conditions

The average nonsupervisory worker in the printing and related support activities industry worked 38.4 hours per week in 2002, compared with 40.5 hours per week across all manufacturing industries. Workers in the industry generally put in an 8-hour day, but overtime often is required to meet production deadlines. Larger companies tend to have shiftwork. There is a fair amount of flexibility with shift schedules and overtime options, which are based largely on seniority.

Working conditions vary by occupation. For example, press operators work in noisy environments and often wear ear protectors. On the other hand, prepress technicians and related workers usually work in quiet, clean, air-conditioned offices. Fortunately, with the advanced technology in machinery, there is not as much strain on the eyes as in the past. Most printing work involves dealing with fine detail, which can be tiring both mentally and physically.

Even with more safety-enhanced machinery, some workers still are subject to occupational hazards. Platemakers, for example, may work with toxic chemicals that can cause skin irritations, and press operators work with rapidly moving machinery that can cause injuries. In recent years, working conditions have become less hazardous as the industry has become more automated. Also, companies are using fewer chemicals and solutions than in the past and are experiencing fewer equipment-related accidents.

Employment

In 2002, the printing industry had about 710,000 wage and salary jobs, in addition to 33,000 self-employed workers, ranking it among the largest manufacturing industries. More than 13 percent of wage and salary jobs were in establishments employing fewer than 10 workers. (See chart.). About 40 percent were in the largest industry sector—commercial lithographic printing (table 1). Printing plants are widely dispersed throughout the country; however, more specialized types of printing tend to be regionally concentrated. For example, financial printing is concentrated in New York City.

Occupations in the Industry

Printing occupations range in skill from those found in quick printing to specialized production occupations rarely found in other industries (table 2). Printing machine operators still account for the most employment of any single occupation in the industry at 13.3 percent. However, relatively newer occupations such as graphic designers and desktop publishers are expected to experience the fastest growth.

Production occupations make up 52.3 percent of industry employment. *Prepress technicians and workers* prepare material for printing presses. Included among their tasks are: Composing text; designing page layout incorporating text, photographs and illustrations, and advertisements, if any; and making printing plates of the pages. Increasingly, prepress technicians receive the material for the pages as electronic computer files, which they load into their computers, and use digital imaging software to layout the pages. "Preflight" technicians examine and edit the pages to ensure that the design, format, settings, quality and all other aspects of the automated desktop work are acceptable, and that the finished product will be completed according to the client's specifications before it is printed.

Table 1. Establishments and wage and salary employment in printing by detailed industry, 2002

Industry segment	Establishments	Employment
Total	100.0	100.0
Commercial lithographic printing	32.2	39.6
Commercial gravure printing	1.1	2.6
Commercial flexographic printing	4.1	6.1
Commercial screen printing	11.9	9.4
Quick printing	26.6	11.2
Digital printing	2.9	2.6
Manifold business forms printing	2.4	6.3
Books printing	1.4	4.9
Blankbook and looseleaf binder manufacturing	0.6	1.7
Other commercial printing	8.2	6.9
Trade binding and related work	2.8	3.4
Prepress services	6.0	5.4

Printing plants that use older technology, which are declining in number, may still employ people in older, manual occupations. These include *typesetting* and *composing machine operators* to prepare text. *Camera operators* start the process of making a lithographic plate by photographing and developing negatives of the material to be printed. *Scanner operators* employ electronic or computerized scanning equipment to produce and screen film separations of photographs or art to use in lithographic printing plates. Operators review all work and adjust the equipment if they need to make corrections to the original. *Lithographic dot etchers* retouch negatives by sharpening or reshaping the images on the negatives. They work by hand, using chemicals, dyes, and special tools. *Film strippers* cut the film to required size and arrange and tape the pieces of negatives onto "flats," or layout sheets, used to make press plates. *Platemakers* produce printing plates by exposing sensitized metal sheets to special light through a photographic negative. Some platemakers operate machines that process the plates automatically. In letterpress and gravure printing, *photoengravers* photograph copy, develop negatives, and prepare photosensitized metal plates for use.

When the material is ready, *printing machine operators* install and adjust the printing plate on the press, mix fountain solution, adjust pressure, ink the printing presses, load paper, and adjust the press to paper size. Operators also must correct any problems that might occur during a press run. *Job printers*, who usually work in small print shops, perform the prepress work as well as operate the press.

During the binding or postpress stage, the printed sheets are transformed into products such as books, catalogs, magazines, or directories. *Bookbinders* assemble books from large, flat, printed sheets of paper. They cut, saw, and glue parts to bind new books and perform other finishing operations, such as decorating and lettering, often using handtools.

A small number of bookbinders work in hand binderies. These highly skilled workers design original or special bindings for publications with limited editions, or restore and rebind

Table 2. Employment of wage and salary workers in printing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002 Number	Employment, 2002 Percent	Percent change, 2002-12
All occupations	710	100.0	3.3
Management, business, and financial occupations	54	7.6	11.9
Top executives	19	2.7	9.4
Marketing and sales managers	5	0.7	19.0
Industrial production managers	6	0.9	12.0
Cost estimators	6	0.9	12.0
Professional and related occupations	30	4.2	17.7
Computer specialists	8	1.1	13.6
Graphic designers	14	2.0	23.2
Sales and related occupations	39	5.4	10.8
Sales representatives, wholesale and manufacturing, except technical and scientific products	23	3.3	12.0
Office and administrative support occupations	138	19.4	-1.3
First-line supervisors/managers of office and administrative support workers	8	1.1	-4.0
Bookkeeping, accounting, and auditing clerks	11	1.6	-4.5
Customer service representatives	26	3.6	12.0
Order clerks	6	0.9	-17.5
Production, planning, and expediting clerks	7	1.0	12.0
Shipping, receiving, and traffic clerks	14	1.9	-10.8
Secretaries and administrative assistants	8	1.2	-8.6
Desktop publishers	9	1.3	25.9
Office clerks, general	10	1.3	-2.5
Installation, maintenance, and repair occupations	12	1.6	11.9
Production occupations	371	52.3	2.2
First-line supervisors/managers of production and operating workers	27	3.8	12.0
Bindery workers	65	9.1	-11.8
Bookbinders	6	0.8	0.6
Job printers	34	4.8	13.2
Prepress technicians and workers	52	7.3	-10.8
Printing machine operators	94	13.3	10.1
Cutting and slicing machine setters, operators, and tenders	11	1.5	12.0
Inspectors, testers, sorters, samplers, and weighers	8	1.1	-2.2
Paper goods machine setters, operators, and tenders	9	1.2	12.0
Helpers—Production workers	21	2.9	0.8
Transportation and material moving occupations	62	8.8	-0.8
Truck drivers, light or delivery services	8	1.1	8.6
Laborers and freight, stock, and material movers, hand	13	1.8	-8.0
Machine feeders and offbearers	17	2.4	0.8
Packers and packagers, hand	13	1.8	-2.4

NOTE: May not add to totals due to omission of occupations with small employment.

rare books. In many other shops, *bindery workers* fold and fasten groups of sheets together, often using a machine stapler, to make "signatures." They then feed the signatures into various machines for stitching or gluing. More of these workers are now using computers on the job, and consequently must learn new skills to operate the more complex machinery.

In addition to these specialized printing occupations, office and administrative support workers, marketing and sales workers, workers in professional and related occupations, and management, business, and financial operations workers also are employed in the printing industry. One occupation becoming more common is customer service representative; workers in this job track the various processes of production and act as liaison between clients and technicians. The representative ensures the customer's satisfaction with the timely delivery of a high-quality product. Also important are *graphic designers*, who use a variety of print and film media to create and execute art that meets a client's needs. They increasingly use computers to lay out and test various designs, patterns, and colors before printing a final design.

Training and Advancement

Workers enter the industry with various educational backgrounds. In general, job applicants must be high school graduates with mathematical, verbal, and written communication skills, and be computer literate.

Helpers generally have a high school or vocational school background, and management trainees may have a college background. Formal graphic arts programs, offered by community and junior colleges and some 4-year colleges, provide an introduction to the industry. Training in desktop publishing is particularly useful. Bachelor's degree programs in graphic arts prepare persons who may want to enter management, and 2-year programs provide technical skills.

As the industry continues to become more computerized, most workers will need a working knowledge of computers. Courses in electronics and computer technology are beneficial for anyone entering the industry, and some employers will offer tuition assistance or continuing education classes.

In the past, apprenticeships were quite common for specialized printing occupations. Now, workers usually are trained informally on the job. Hand bookbinders are one exception. These workers usually need a 4-year apprenticeship to learn the craft of restoring rare books and producing valuable collector's items.

The length of on-the-job training needed to learn skills varies by occupation and shop. For example, press operators begin as helpers and advance to press operator positions after years of training. Bindery workers begin by doing simple tasks such as moving paper from cutting machines to folding machines. Workers learn how to operate more complicated machinery within a few months. Training often is given under the close supervision of an experienced or senior employee. Through experience and training, workers may advance to more responsible positions. Workers usually begin as helpers, advance to skilled craft jobs, and eventually may be promoted to supervisor.

Opportunities for advancement depend on the specific plant or shop. Technological changes will continue to introduce new types of computerized equipment or dictate new work procedures. Workers with computer and mechanical aptitude are especially in demand, so proper training or retraining will be essential to careers in printing.

Earnings

In 2002, average weekly earnings for production workers in the printing industry were $573, compared with $619 for all production workers in manufacturing. Weekly wages in the printing industry can vary significantly by industry sector ranging from $431 in commercial screen printing, to $638 in commercial lithograph printing. Average hourly earnings of the largest occupations in the industry also vary as shown in table 3.

The principal union in this industry is the Graphic Communications International Union. About 6 percent of printing industry employees are union members or are covered by a union contract, compared with 15 percent of workers throughout the economy, but this proportion varies greatly from city to city.

Table 3. Median hourly earnings of the largest occupations in printing, 2002

Occupation	Printing	All industries
General and operations managers	$35.93	$32.80
Sales representatives, wholesale and manufacturing, except technical and scientific products	23.90	20.54
First-line supervisors/managers of production and operating workers	21.88	20.64
Prepress technicians and workers	16.05	14.98
Printing machine operators	15.02	13.95
Customer service representatives	14.89	12.62
Job printers	14.84	14.47
Bindery workers	11.02	10.51
Machine feeders and offbearers	10.49	10.50
Helpers—production workers	10.18	9.25

Outlook

Wage and salary employment in the printing and related support activities industry is projected to grow 3.3 percent over the 2002-12 period, compared with the 16 percent growth projected for the economy as a whole. This modest growth reflects the expanding use of the Internet, which reduces the need for printed materials, and the increasing computerization of the printing process. The printing industry, though, will continue to supply products for education, business, and leisure for a long time to come. Although technological innovation and automation, mergers between and acquisitions of small and medium-size printing firms, and partnering services offered among printing firms will curb job growth, certain sectors of the industry will experience more employment increase than will others.

Employment in support activities for printing is expected to decline because more companies are preparing printing and performing postpress in-house. Employment in commercial printing companies is projected to rise, but only modestly, as digital printing technology allows clients to perform more work in-house. Employment in manifold business forms should continue to decrease as firms take customers' orders over the Internet, a development that allows companies to disseminate purchasing information throughout all departments much more easily. Declining employment in blankbooks and looseleaf binding firms also reflects increased competition from imports and a shrinking export market share for this industry segment.

Employment growth will differ among the various occupations in the printing industry, largely because of technological advances. Processes currently performed manually are being computerized, causing a shift from craft occupations to related occupations that perform the same function. For example, employment of desktop publishing specialists is expected to increase much faster than the average for all occupations over the 2002-12 period as the elements of print production, including layout, design, and printing, increasingly are performed electronically. In contrast, demand for prepress technicians and workers—particularly those who perform these tasks manually, including pasteup workers, photoengravers, camera operators, film strippers, and platemakers—is expected to decline. Job printers, however, are expected to experience growth as some firms contract out typesetting and composition work to the small shops in which job printers are primarily employed. In response to the growth in electronic printing, employment of press operators is expected to decline, as is that of bookbinders and bindery workers.

New technology and equipment will require workers to update their skills to remain competitive in the job market. For example, pasteup workers will have to learn how to lay out pages using a computer or face losing their jobs. The concepts and principles behind page layout and design are unchanged, but the workers will have to learn how to perform their work using different tools.

Sources of Additional Information

Information on apprenticeships and other training opportunities may be obtained from local employers such as printing shops, local offices of the Graphic Communications International Union, local affiliates of Printing Industries of America, or local offices of the State employment service.

For general information on careers and training programs in printing, contact:

- Graphic Communications Council, 1899 Preston White Dr., Reston, VA 20191-5468. Internet: **http://www.teched.vt.edu/gcc**
- Graphic Arts Technical Foundation, 200 Deer Run Rd., Sewickley, PA 15143-2600. Internet: **http://www.gain.net**
- Graphic Communications International Union, 1900 L St. NW., Washington, DC 20036-5002. Internet: **http://www.gciu.org**
- National Association for Printing Leadership, 75 W. Century Rd., Paramus, NJ 07652-1408. Internet: **http://www.napl.org**
- Printing Industries of America, 100 Daingerfield Rd., Alexandria, VA 22314-2886. Internet: **http://www.gain.net**

Information on most occupations in the printing and publishing industry, including the following, may be found in the 2002-03 *Occupational Outlook Handbook*:

- Artists and related workers
- Bookbinders and bindery workers
- Desktop publishers
- Prepress technicians and workers
- Printing machine operators